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July 1942 ET-198

United States Department of Agriculture
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A WHEELBARROW ASSEMBLY FOR APPLYING CONCENTRATED SPRAYS TO EXPERIMENTAL PLOTS

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A wheelbarrow type of compressed-air atomizer (fig. 1) can be used for testing concentrated sprays. This machine has been used in open plantations for the practical application of concentrates against such insects as the European pine shoot moth and sawflies on trees up to 8 feet in height.

This machine, which weighs 119 pounds, consists of a 5/8-horsepower gasoline engine and single-cylinder air compressor mounted on a 10- by 18-inch metal base; an airtight, 6.5-pound aluminum tank of 2 gallons' capacity; a pneumatic rubber tire wheel 15 inches in diameter; and a wheelbarrow chassis constructed mostly of angle iron, 1/8 inch thick by $1\frac{1}{4}$ inches. A "kick stand" is provided to prevent the machine from turning over when standing on a steep hill. The greatest weight is distributed near or over the wheel in order to lessen the amount of lifting and pushing needed to move the machine. The joints are either welded or bolted.

Two lengths of light $\frac{1}{4}$-inch hose lead from the spray tank, one conveying air to the nozzle and the other conveying liquid to an extension rod with an inside diameter of 1/8 to 1/4 inch, and thence to the nozzle. The extension rod is provided with a shut-off valve. When in use the two lines of hose are wrapped against each other with adhesive tape to facilitate handling.

The nozzles are of the internal-mix type and are adjustable for forming either a fan-shaped spray of 12 to 14 inches in width, or a solid, round cone spray 6 to 8 inches in diameter. The round cone spray is narrower than the fan-shaped spray but is driven with more force. The compressor delivers 3.5 cubic feet of air per minute and can supply a maximum of three nozzles with 20 pounds of air pressure. The degree of atomization increases with decrease in the output of liquid and vice versa. Doubling the output of liquid practically quadruples the size of the droplets. For best coverage the delivery per hour per spray aperture should not exceed 1.5 gallons. The diameter of apertures should not be less than 1/25 inch when applying concentrates containing solid particles, or not less than 1/40 inch when applying oils and solutions.

This type of machine can operate a 7/8-quart paint cup with hand gun (fig. 1), a single nozzle attached to an extension rod, a spray broom, a row boom, or a broadcast boom. When the paint cup is used the spray hose is removed, and one end of the air hose is connected directly to the compressor and the other end to the paint gun. The paint cup is ideal for testing various concentrated sprays in small plots.

The liquid output of the nozzle shown in figure 1 is regulated by a needle valve. This is not highly desirable because the needle plugs the center core of the aperture shell, which sometimes causes clogging. A better way of regulating liquid output consists of modifying the unit in such a way as to force the spray through the nozzles by means of a gear pump, centrifugal pump, small hydraulic pump, or by compressed air. When regulated by compressed air, much less pressure is applied to the liquid than to the air line. Four pounds of pressure is often applied to the liquid and 20 pounds to the air line. One objection to applying air to the liquid is that it requires an airtight tank, and the rate of liquid flow may be greater than and not as even as for "direct" or "positive" methods of application.

Since the engine-compressor unit weighs only 51 pounds, it can be picked up by the handle and carried from plot to plot when small areas are being treated.

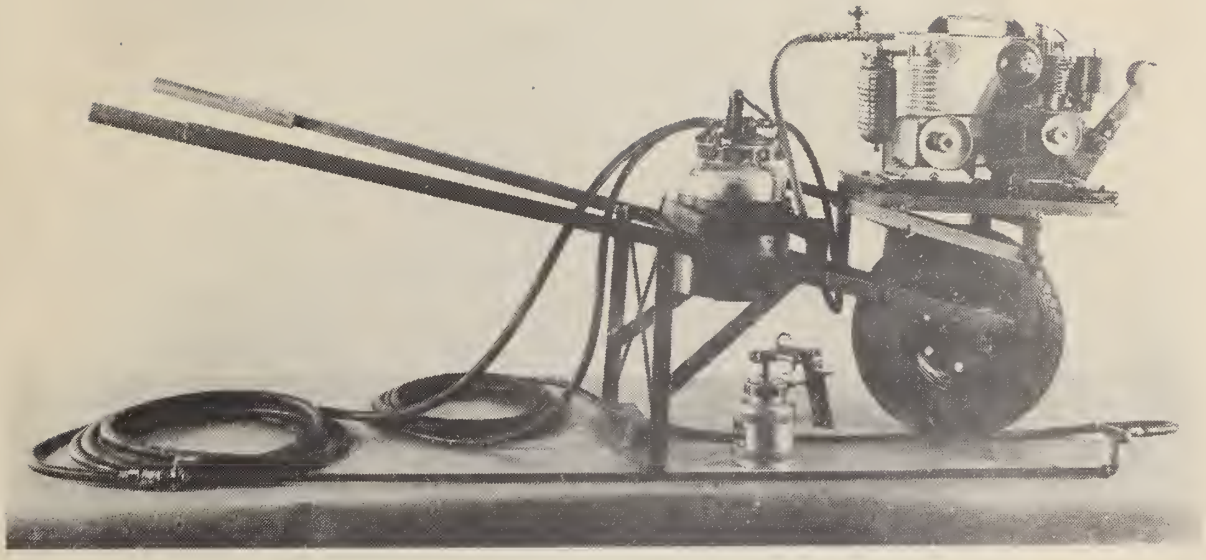

Figure 1.--A wheelbarrow assembly for atomizing concentrated sprays, showing chassis, gasoline engine, compressor, airtight material container, extension rod, and 7/8-quart hand gun. The chassis was made locally, and the other materials were obtained from the Electric Sprayit Company of Sheboygan, Wisconsin.

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